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Selection of patients for early discharge after acute myocardial infarction

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We report a prospective study of patients with acute myocardial infarction in whom the use of four simple risk factors allowed the identification of a group of patients who could be safely allowed home on their 7th day in hospital. This group comprised 40 per cent of all admissions with acute myocardial infarction who survived 6 days. Of these, 68 per cent were discharged by the 7th day. No patient in this group died in the ensuing 3-month period.

Duration of hospital stay after acute myocardial infarction has tended to get shorter over the past 50 years (Rose, 1972; Tucker *et al.*, 1973; Hutter *et al.*, 1973). In a previously reported retrospective study (Boyle *et al.*, 1972), we found that certain simply ascertained factors could select a group of patients with excellent prognosis who could be safely discharged home on the 7th day.

Since then we have examined these prognostic factors prospectively and have based our discharge policy on them. We now present our experience.

Subjects and methods

The patients were admitted to the coronary care unit at the Ulster Hospital by mobile coronary care unit or through casualty. Criteria for diagnosis of myocardial infarction and general principles of care have already been described (Walsh *et al.*, 1972). However, in the period covered by the present study oral antiarrhythmic drugs were used more freely after discharge from hospital. Data refer to 275 admissions of acute myocardial infarction involving 253 patients over the period October 1971 to September 1972. In each patient the following factors were recorded.

(1) Presence of sustained sinus tachycardia (rate greater than 100/min), lasting at least 1 hour in the first 48 hours in hospital.
(2) Persistence of ST segment elevation more than 2 mm in any lead except aVR, six days after infarction.
(3) Occurrence of cardiac pain requiring diamorphine for relief after 48 hours and before 7 days after the infarction.
(4) Occurrence of certain arrhythmias (ventricular ectopics if multifocal, with R on T phenomenon or greater than 5/min, ventricular tachycardia, ventricular fibrillation, second- and third-degree heart block, left or right bundle-branch block) after 48 hours and before 7 days after infarction.

These four factors have been called the 'risk factors'.

Patients in whom none of these risk factors occurred were allowed home by the 7th day unless social conditions or other medical problems prevented this. Patients

TABLE 1 *Presence or absence of risk factors related to cumulative mortality over following 12 months*

	No. of patients	*3-month mortality*	*12-month mortality*
All patients (included)	275	12 (4%)	20 (7%)
Sinus tachycardia	106 (39%)	9 (8%)	17 (16%)
ST segment elevation	95 (35%)	7 (8%)	10 (10%)
Recurrent arrhythmia	29 (10%)	8 (28%)	11 (38%)
Recurrent pain	23 (12%)	8 (25%)	12 (37%)

TABLE 2 *Frequency of risk factors related to cumulative mortality from 7th day after myocardial infarction to subsequent follow-up during 12 months*

No. of risk factors	*No. of patients*	*3-month mortality*	*12-month mortality*
0	109	0	2 (2%)
1	84	0	3 (4%)
2	54	4 (7%)	8 (15%)
3	28	6 (21%)	7 (25%)
Any risk factor	166	11 (6%)	20 (11%)

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TABLE 3 *Distribution of readmissions and reinfarction in relation to risk factors*

No. of risk factors	*No. of patients*	*3 months* *Reinfarction*	*Readmission*	*12 months* *Reinfarction*	*Readmission*
No risk factor	109	1 (1%)	5 (4%)	5 (5%)	11 (10%)
One risk factor	84	3 (4%)	10 (12%)	6 (7%)	13 (15%)
Two risk factors	54	5 (9%)	10 (18%)	5 (9%)	14 (25%)
Three risk factors	28	5 (18%)	6 (21%)	6 (21%)	7 (25%)
Any risk factor	166	13 (8%)	26 (16%)	17 (12%)	34 (20%)

TABLE 4 *Cumulative duration of hospital stay*

	No. of patients	*Discharged by 7th day*	*8th day*	*9th day*	*10th day*	*11th day*
No risk factor (%)	109 (40%)	74 (68%)	89 (82%)	103 (94%)	107 (98%)	108 (99%)
Any risk factor	166 (60%)	30 (18%)	46 (28%)	61 (36%)	102 (61%)	107 (64%)
All patients	275	104 (28%)	135 (49%)	163 (59%)	208 (75%)	214 (78%)

in whom any risk factor was present were normally kept at least 9 days. However, because of pressure on beds certain of these patients were discharged earlier. Such patients had good social conditions, had only one risk factor, and had a low acute coronary prognostic index as described by Norris *et al.* (1969). Patients were reviewed 3 months and 12 months after discharge.

Results

Overall mortality of patients at 3 months and at 1 year was 4 per cent and 7 per cent, respectively. The presence of each of the risk factors (Table 1) was associated with a higher mortality. Three deaths were not cardiac.

Table 2 relates mortality to the number of risk factors present. Here it can be seen that 109 patients (40%) had no risk factors. None of these patients died in the following 3 months and 2 died within a year; 84 patients (30%) had one risk factor and none of these died within 3 months and the 12-month mortality was low. Patients with two or three risk factors had a high mortality at 3 months and 12 months.

The relation between readmission or reinfarction and the presence of risk factors is shown in Table 3. Readmissions within 3 months of patients with no risk factor were few (4%) and only one patient had a further infarction. Patients with risk factors had a higher incidence of readmissions and reinfarction, particularly patients with two or more risk factors. A similar trend was present at 12 months.

Duration of stay in hospital is shown in Table 4. Median duration of stay for all patients was 8 days. Of patients with no risk factors, 68 per cent were discharged by the 7th day, that is after 6 days in hospital, the remainder staying a short time longer. Patients with risk factors were kept in hospital longer, the median period in hospital being 9 days.

Discussion

Our previous study (Boyle *et al.*, 1972), using information obtained retrospectively, suggested that the use of simply recognized risk factors would identify a group of patients who could be allowed home as early as the 7th day. Using them prospectively, we were able to identify a group of 40 per cent of patients with myocardial infarction who could safely be allowed home early. Not only did none of these patients die within the following 3 months but the reinfarction rate and readmission rate were low and the findings at 12 months were also satisfactory.

One unexpected finding was the lower mortality at 3 months in the present study compared with the earlier one (Boyle *et al.*, 1972). In it patients with one risk factor had a mortality of 13 per cent compared with no mortality in this study and in the patients with more than one risk factor, 24 per cent compared with 12 per cent in the present study. Comparing Norris's coronary prognostic index in the two series, the patients in the prospective series tended to have slightly higher values, indicating more severe infarction, so this cannot account for the differences in mortality. A possible reason may be greater care given to patients resulting from our recognition of their increased risk, and in wider

use of oral antiarrhythmic drugs after the patient's discharge.

We feel that our simple selection procedure allows a significant group of patients to be allowed home safely after only a week in hospital, and so permits a unit to concentrate its resources on patients early in the infarction stage, and for longer periods on patients at an increased risk.

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TABLE 4

12th day	*13th day*	*14th day*	*More than 14 days*
108 (99%)	109	109	109
115 (69%)	122 (73%)	132 (79%)	166
222 (81%)	230 (84%)	241 (88%)	275

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